

What is claimed is:

- 1 1. Biocompatible particles for delivery of a vaccine to the *pulmonary* system comprising  
2 an immunizing agent; wherein the particles have a tap density less than 0.4 g/ml and at  
3 least 90% of the particles have geometric dimensions between about 5  $\mu\text{m}$  and about 30  
4  $\mu\text{m}$ .
- 1 2. The particles of claim 1 wherein the immunizing agent is selected from the group  
2 consisting of a live attenuated virus or bacterial vaccine, a recombinant virus or bacterial  
3 vaccine encoding an immunizing antigen or a combination of antigens against which  
4 elicitation of an immune response is desired, and an inactivated virus or bacterial vaccine.
- 1 3. The particles of claim I combined with large biodegradable carrier particles having a  
2 mass mean diameter in the range of about 50  $\mu\text{m}$  to about 100  $\mu\text{m}$ .
- 1 4. The particles of claim 1 combined with a pharmaceutically acceptable carrier for  
2 administration to the respiratory tract.
- 1 5. The particles of claim 1 wherein at least 90% of the particles have a mass mean  
2 diameter between about 5  $\mu\text{m}$  and about 15  $\mu\text{m}$ .
- 1 6. The particles of claim 1 wherein at least 90% of the particles have a mean diameter  
2 between about 9  $\mu\text{m}$  and about 11  $\mu\text{m}$ .
- 1 7. The particles of claim 1 wherein at least 50% of the particles have a tap density of less  
2 than 0.1 g/cm<sup>3</sup>.
- 1 8. The particles of claim 1 wherein the particles further comprise a polymeric material.
- 1 9. The particles of claim 1 wherein the particles further comprise a non-polymeric  
2 material.
- 1 10. Biocompatible particles for delivery of a targeting molecule to the *pulmonary* system  
2 wherein the targeting molecule is attached to the particles and wherein the particles have

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1 21. A method for delivery of an actively immunizing amount of a vaccine to the  
2 **pulmonary** system comprising: administering to the respiratory tract of a patient in need  
3 thereof of an effective amount of biocompatible particles incorporating said vaccine,  
4 wherein the particles have a tap density of less than about 0.4 g/cm.<sup>3</sup> and at least  
5 90% of the particles have geometric dimensions between about 5 .mu.m and about 30  
6 .mu.m.

1 22. The method of claim 21 wherein the agent is selected from the group consisting  
2 of viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and  
3 combinations thereof

1 23. The method of claim 21 wherein the particles are combined with large  
2 biodegradable carrier particles having a mass mean diameter in the range of about 50  
3 .mu.m to about 100 .mu.m.

1 24. The method of claim 21 wherein the particles are combined with a  
2 pharmaceutically acceptable carrier for administration to the respiratory tract.

1 25. The method of claim 21 wherein at least 90% of the particles have a mass mean  
2 diameter between about 5 .mu.m and about 15 .mu.m.

1 26. The method of claim 21 for delivery to the alveolar zone of the lung wherein at  
2 least 90% of the particles have a mean diameter between about 9 and about 11 .mu.m.

1 27. The method of claim 21 wherein at least 50% of the administered particles have  
2 a tap density of less than about 0.1 g/cm.<sup>3</sup>.

1 28. The method of claim 21 wherein the particle's further comprise a polymeric material.

1 29. The method of claim 21 wherein the particles further comprise a non-polymeric  
2 material.

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1 30. A method for delivery of a vaccine and a targeting molecule to the *pulmonary*  
2 system comprising: administering to the respiratory tract of a patient in need of  
3 treatment, prophylaxis or diagnosis an effective amount of biocompatible particles,  
4 wherein the particles have a tap density less than about 0.4 g/cm.<sup>3</sup> and at least 90%  
5 of the particles have geometric dimensions between about 5 .mu.m and about  
6 30 .mu.m, and wherein the targeting molecule is attached to the particles which further  
7 comprise the vaccine.

1 31. A method for delivery of a vaccine to the *pulmonary* system comprising:  
2 administering to the respiratory tract of a patient in need thereof of an effective  
3 amount of biocompatible particles comprising said vaccine, wherein the particles  
4 have a tap density of less than about 0.4 g/cm.<sup>3</sup> and at least 90% of the particles  
5 have an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.

1 32. The method of claim 31 wherein the agent is selected from the group consisting  
2 of viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and  
3 combinations thereof.

1 33. The method of claim 31 wherein the particles are combined with large  
2 biodegradable carrier particles having a mass mean diameter in the range of about 50  
3 .mu.m to about 100 .mu.m.

1 34. The method of claim 31 wherein the particles are combined with a  
2 pharmaceutically acceptable carrier for administration to the respiratory tract.

1 35. The method of claim 31 wherein at least 90% of the particles have an  
2 aerodynamic diameter between about 1 .mu.m and about 3 .mu.m.

1 36. The method of claim 31 for delivery to the alveolar zone of the lung wherein  
2 at least 90% of the particles have an aerodynamic diameter between about 3 .mu.m  
3 and about 5.mu.m.

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1 37. The method of claim 31 wherein at least 50% of the administered particles have  
2 a tap density of less than about 0.1 g/cm.<sup>3</sup>.

1 38. The method of claim 31 wherein the particles further comprise a polymeric  
2 material.

1 39. The method of claim 31 wherein the particles further comprise a non-polymeric  
2 material.

1 40. A method for delivery of a vaccine and a targeting molecule to the *pulmonary*  
2 system comprising: administering to the respiratory tract of a patient in need of  
3 treatment, prophylaxis or diagnosis an effective amount of biocompatible particles  
4 comprising said vaccine, wherein the particles have a tap density less than about  
5 0.4 g/cm.<sup>3</sup> and at least 90% of the particles have an aerodynamic diameter between  
6 about 1 . $\mu$ m and about 5 . $\mu$ m, and wherein the targeting molecule is attached to the  
7 particles.

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